

What is claimed is:

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1. A cleaning device for a spindle chuck, comprising:  
a spindle chuck engaging device; and  
a particle removal surface on the spindle chuck engaging device, the particle removal surface being adapted to remove a particle from a spindle chuck.
  2. The device of claim 1, wherein the spindle chuck engaging device includes an arm for moving the particle removal surface into contact with a face of a spindle chuck.
  3. The device of claim 2, wherein the spindle chuck engaging device includes a spin drive for rotating the particle removal surface relative to the arm.
  4. The device of claim 2, wherein the arm includes a joint.
  5. The device of claim 4, wherein the arm includes a fixed support and the joint pivots the particle removal surface relative to the fixed support.
  6. The device of claim 1, wherein the spindle chuck engaging device includes a spin drive for rotating the particle removal surface.
  7. The device of claim 6, wherein the spin drive rotates the particle removal surface relative to the spindle chuck.
  8. A cleaning device for a spindle chuck in an environment, comprising:  
a spindle chuck engaging device;  
a particle removal surface on the spindle chuck engaging device, the particle removal surface being adapted to remove a particle from a spindle chuck; and

a vacuum source for removing the particle from the environment of the spindle chuck.

9. The device of claim 8, wherein the spindle chuck engaging device includes an arm for moving the particle removal surface into contact with a face of a spindle chuck, wherein the arm includes vacuum pathways fluidly connected to the vacuum source.

10. The device of claim 9, wherein the spindle chuck engaging device includes a spin drive for rotating the particle removal surface relative to the arm.

11. The device of claim 9, wherein the arm includes a joint.

12. The device of claim 11, wherein the arm includes a fixed support, the joint pivots the particle removal surface relative to the fixed support, and the vacuum pathways remain fluidly connected with the particle removal surface being pivoted by the joint.

13. The device of claim 8, wherein the spindle chuck engaging device includes a spin drive for rotating the particle removal surface.

14. The device of claim 13, wherein the spin drive rotates the particle removal surface relative to the spindle chuck.

15. A cleaning device for a spindle chuck in an environment, comprising:  
a spindle chuck engaging device;  
a particle removal surface on the spindle chuck engaging device, the particle removal surface being adapted to remove a particle from a spindle chuck;  
a vacuum source for removing the particle from the environment of the spindle chuck; and

pathways extending through the spindle engaging device and connected to the vacuum source, the pathways including ports at the particle removal surface.

16. The device of claim 15, wherein the spindle chuck engaging device includes an arm for moving the particle removal surface into contact with a face of a spindle chuck.

17. The device of claim 16, wherein the pathways extend through the arm.

18. The device of claim 17, wherein the spindle chuck engaging device includes a spin drive for rotating the particle removal surface relative to the arm.

19. The device of claim 18, wherein the spin drive rotates the particle removal surface relative to the spindle chuck and the ports are in close proximity to the surface of the spindle chuck to vacuum a particle removed from the spindle chuck by the particle removal surface.

20. The device of claim 16, wherein the arm includes a joint.

21. The device of claim 16, wherein the arm includes a fixed support, the joint pivots the particle removal surface relative to the fixed support, and the pathways remain fluidly connected with the particle removal surface being pivoted by the joint.

22. A cleaning device for a spindle chuck, comprising:  
a spindle chuck engaging device; and  
a particle removal, ceramic surface on the spindle chuck engaging device.

23. The device of claim 22, wherein the spindle chuck engaging device includes an arm for moving the ceramic surface into contact with a face of a spindle chuck.

24. The device of claim 22, wherein the spindle chuck engaging device includes a spin drive for rotating the ceramic surface relative to the arm.
25. The device of claim 24, wherein the arm includes a joint.
26. The device of claim 25, wherein the arm includes a fixed support and the joint pivots the ceramic surface relative to the fixed support.
27. A cleaning device for a processing surface, comprising:  
a processing surface engaging device; and  
a particle removal unit on the processing surface engaging device, wherein the particle removal unit includes bristles capable of contacting a face of the processing surface to remove a particle therefrom.
28. The device of claim 27, wherein the processing surface engaging device includes an arm for moving the particle removal surface into contact with a face of a processing surface.
29. The device of claim 28, wherein the processing surface engaging device includes a spin drive for rotating the particle removal unit relative to the arm.
30. The device of claim 29, wherein the arm includes a joint.
31. The device of claim 30, wherein the arm includes a fixed support and the joint pivots the particle removal surface relative to the fixed support.
32. A cleaning device for a spindle chuck, comprising:  
a spindle chuck engaging device;

a particle removal unit on the spindle chuck engaging device, wherein the particle removal unit includes:

a head;

bristles connected to the head and capable of contacting a face of the spindle chuck to remove a particle therefrom;

a vacuum source for removing the particle from the environment of the spindle chuck; and

pathways extending through the head and connected to the vacuum source, the pathways including ports at a surface of the head.

33. The device of claim 32, wherein the spindle chuck engaging device includes an arm connected to the particle removal unit and capable of moving the particle removal unit into contact with a face of a spindle chuck.

34. The device of claim 33, wherein the spindle chuck engaging device includes an arm connected to the head and capable of moving the head into a position adjacent a face of a spindle chuck.

35. The device of claim 34, wherein the arm moves the ports adjacent a face of a spindle chuck such that a particle removed from the face is vacuumed into one of the ports.

36. The device of claim 33, wherein the spindle chuck engaging device includes an arm connected to the head and capable of moving the bristles into a contact with a face of a spindle chuck.

37. A track system for handling wafers, comprising:  
a spindle chuck assembly; and

an automated spindle chuck cleaner capable of cleaning the spindle chuck assembly.

38. The system of claim 37, wherein the spindle chuck assembly includes a wafer holding head, and the spindle chuck cleaner cleans the head.

39. The system of claim 38, wherein the automated spindle chuck cleaner includes a ceramic surface that contacts the head to remove at least one particle therefrom.

40. The system of claim 38, wherein the automated spindle chuck cleaner includes at least one bristle that contacts the head to remove at least one particle therefrom.

41. The system of claim 38, wherein the the automated spindle chuck cleaner includes a plurality of bristles each adapted to contact the head.

42. The system of claim 38, wherein the automated spindle chuck cleaner includes a vacuum source that is fluidly adjacent the head to remove at least one particle therefrom.

43. The system of claim 38, wherein the automated spindle chuck cleaner includes a ceramic surface that contacts the head to remove at least one particle from a surface of the spindle chuck assembly and a vacuum source that is adjacent the head to remove at least one particle from an environment of the spindle chuck assembly.

44. The system of claim 44, wherein the at least one bristle includes a plurality of bristles each adapted to contact the head.

45. The system of claim 38, wherein the spindle chuck assembly includes head for holding a wafer, a resist dispenser, a drain, and an exhaust.

46. The system of claim 45, wherein the spindle chuck assembly includes a vacuum source holding a wafer on the head.

47. The system of claim 45, wherein the resist dispenser includes a nozzle that is movable in at least three directions.

48. The system of claim 38, wherein the spindle chuck assembly includes a bowl having an open top, a spindle shaft extending upwardly into the bowl, a head on the shaft and positioned in the bowl.

49. A track system for handling wafers, comprising:  
a wafer processing unit including a spindle chuck; and  
an automated spindle chuck cleaner.

50. The system of claim 49, wherein the spindle chuck includes a wafer holding head, and the spindle chuck cleaner cleans the head.

51. The system of claim 50, wherein the automated spindle chuck cleaner includes a ceramic surface that contacts the head to remove at least one particle therefrom.

52. The system of claim 50, wherein the automated spindle chuck cleaner includes at least one bristle that contacts the head to remove at least one particle therefrom.

53. The system of claim 52, wherein the automated spindle chuck cleaner includes a plurality of bristles each adapted to contact the head.

54. The system of claim 50, wherein the automated spindle chuck cleaner includes a vacuum source that is adjacent the head to remove at least one particle therefrom.

55. The system of claim 50, wherein the automated spindle chuck cleaner includes a ceramic surface that contacts the head to remove at least one particle from a surface of the spindle chuck and a vacuum source that is adjacent the head to remove at least one particle from an environment of the spindle chuck.
56. A track system for handling wafers, comprising:  
a wafer processing unit including a wafer processing surface; and  
an automated wafer processing surface cleaner.
57. The system of claim 56, wherein the wafer processing unit is a resist coat device.
58. The system of claim 56, wherein the wafer processing unit includes at least one of a group consisting essentially of a develop and rinse device, a spin coating device, and a resist coat device.
59. A track system for handling wafers, comprising:  
a wafer processing unit including a wafer support; and  
an automated wafer support cleaner adapted to non-manually clean contaminants from the wafer support.
60. The system of claim 59, wherein the wafer processing unit includes at least one of a group consisting essentially of a vapor priming device, a soft bake device, a post exposure bake device, and a cool plate device.
61. A wafer processing system, comprising:  
a track unit including a spindle chuck;  
an automated spindle chuck cleaner adapted to non-manually clean contaminants from the spindle chuck; and  
an alignment and exposure device.



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62. The system of claim 61, wherein the alignment and exposure device is a stepper.
63. The system of claim 61, wherein the alignment and exposure device is a step and scan device.
64. The system of claim 61, wherein the alignment and exposure device is a scanner.
65. The system of claim 61, wherein the spindle chuck includes a wafer holding head, and the spindle chuck cleaner cleans the head.
66. The system of claim 65, wherein the automated spindle chuck cleaner includes a ceramic surface that contacts the head to remove at least one particle therefrom.
67. The system of claim 65, wherein the automated spindle chuck cleaner includes at least one bristle that contacts the head to remove at least one particle therefrom.
68. The system of claim 65, wherein the automated spindle chuck cleaner includes a vacuum source that is adjacent the head to remove at least one particle therefrom.
69. The system of claim 61, wherein the track unit includes a plurality of track devices, each including at least one spindle chuck.
70. A track system for handling wafers, comprising:
  - a spindle chuck assembly including a head adapted to releasably hold a wafer;
  - an automated spindle chuck cleaner including a cleaning surface capable of cleaning the spindle chuck assembly; and
  - wherein the cleaning surface is harder than the head.

71. A track system for handling wafers, comprising:  
a spindle chuck assembly including a head adapted to releasably hold a wafer;  
an automated spindle chuck cleaner including a cleaning surface capable of  
cleaning the spindle chuck assembly; and  
wherein the head is harder than the cleaning surface.
72. A system for handling wafers, comprising:  
a wafer processing unit including a spindle chuck, wherein the spindle chuck  
includes a head formed of polyetheretherketone (PEEK); and  
an automated spindle chuck cleaner adapted to non-manually clean the head.
73. The system of claim 72, wherein the spindle chuck cleaner includes a brush  
capable of contacting the head.
74. The system of claim 72, wherein the spindle chuck cleaner includes a ceramic  
surface capable of contacting the head.
75. The system of claim 74, wherein the spindle chuck cleaner includes a vacuum  
for removing contaminants from the PEEK head.
76. The system of claim 74, wherein the spindle chuck includes a rigid shaft fixedly  
connected to the head and a spin motor connected to the rigid shaft for rotating same.
77. A cleaning system for removing particles having a minimum acceptable size  
from integrated circuit fabrication equipment, comprising:  
a chuck adapted to hold a wafer, the chuck having a particle thereon, the particle  
having at least the minimum acceptable size; and  
a cleaning head positioned less than the minimum acceptable size from the  
chuck and capable of removing the particle from the chuck.

78. The system of claim 77, wherein the cleaning head includes a base and a brush connected to the base, the brush having bristles cantilevered from the base, and the free ends of the bristles being less than the minimum acceptable size from the chuck.

79. The system of claim 77, wherein at least one of the chuck and cleaning head is connected to a motor capable of rotating the at least one of the chuck and cleaning head.

80. The system of claim 77, wherein the cleaning head has a vacuum source vacuuming the removed particles from an environment of the chuck.

81. The system of claim 77, wherein the cleaning head is positioned less than 0.2 microns from the chuck.

82. A method for cleaning a head adapted to releasably hold a wafer, comprising:  
providing a cleaning surface;  
moving the cleaning surface into contact with the head; and  
removing contaminants from the head.

83. The method of 82, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface into vertical alignment with the head.

84. The method of 83, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface downwardly onto the head.

85. The method of claim 84, wherein removing contaminants from the head includes rotating the cleaning surface on the head.

86. The method of claim 84, wherein removing contaminants from the head includes rotating the head on the cleaning surface.

87. The method of claim 87, wherein rotating the head includes rotating the head at a variable rpm.

88. The method of claim 87, wherein rotating the head includes rotating the head at at least about 5,000 rpm.

89. The method of claim 87, wherein rotating the head includes rotating the head at about 5,000 rpm.

90. The method of claim 87, wherein rotating the head includes rotating the head at less than about 10,000 rpm.

91. A method for cleaning a head adapted to releasably hold a wafer, comprising:  
providing a cleaning surface;  
removing a wafer from the head;  
thereafter, moving the cleaning surface into contact with the head; and  
removing contaminants from the head.

92. The method of 91, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface into vertical alignment with the head.

93. The method of 92, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface downwardly onto the head.

94. The method of claim 91, wherein removing contaminants from the head includes rotating the cleaning surface on the head.

95. The method of claim 91, wherein removing contaminants from the head includes rotating the head on the cleaning surface.

96. Machine executable code stored on machine readable media, wherein the code comprises:

providing a cleaning surface;  
moving the cleaning surface into contact with the head; and  
removing contaminants from the head.

97. The code of 96, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface into vertical alignment with the head.

98. The code of 97, wherein moving the cleaning surface into contact with the head includes moving the cleaning surface downwardly onto the head.

99. The code of claim 96, wherein removing contaminants from the head includes rotating the cleaning surface on the head.

100. The code of claim 96, wherein removing contaminants from the head includes rotating the head on the cleaning surface.

101. The code of claim 96, wherein moving the cleaning surface into contact with the head is delayed until after removing a wafer from the head.

102. The code of claim 101, wherein the delay is at least 5 seconds.

103. A method of wafer processing, comprising:  
placing a wafer on a head of a spindle chuck;  
performing a fabrication process on the wafer;  
removing the wafer from the head;  
automatically cleaning contaminants from the head.

104. The method of claim 103, wherein the recited steps are repeated.
105. The method of claim 103, wherein placing a wafer, performing a fabrication process, and removing a wafer are performed a plurality of times before automatically cleaning contaminants from the head.
106. The method of claim 103, wherein placing a wafer, performing a fabrication process, and removing a wafer are performed on a batch of wafers before automatically cleaning contaminants from the head.
107. A method of wafer processing, comprising:
  - placing a wafer on a head of a spindle chuck;
  - performing a fabrication process on the wafer;
  - removing the wafer from the head;
  - automatically cleaning contaminants from the head; and
  - returning the wafer to head.
108. The method of claim 107, wherein the recited steps are repeated.
109. The method of claim 107, wherein removing the wafer from the head, automatically cleaning contaminants from the head, and returning the wafer to head are performed after a plurality of wafers are subjected to the fabrication process.
110. The method of claim 108, wherein removing the wafer from the head, automatically cleaning contaminants from the head, and returning the wafer to head are performed after a batch of wafers are subjected to the fabrication process.

111. A method of wafer processing, comprising:

performing a fabrication process on a batch of wafers, wherein performing the fabrication process includes holding a last wafer in the batch on a spindle chuck and performing a fabrication process on the last wafer;

removing the last wafer from the spindle chuck; and

automatically cleaning the spindle chuck.

112. The method of claim 135, further comprising setting a first wafer in a subsequent batch of wafers on the spindle chuck after both removing the last wafer from the spindle chuck and automatically cleaning engaging the spindle chuck with a cleaning head.

113. The method of claim 112, wherein the performing a fabrication process and automatically cleaning the spindle chuck are repeated for the subsequent batch.